Interdisciplinary *people* drive groundbreaking science

Over the past 5000 years of human scientific exploration, the concept of "large interdisciplinary research teams" has only recently emerged in an effort to solve complex scientific problems of the modern era. Mammoth scientific projects, where the technical goals have been clearly defined, necessitated the need for large, globally collaborating teams. The Human Genome Project, for example, employed engineers, biologists, chemists and computer scientists spanning four continents. Resting on the successes of the sequenced genome, the National Institutes of Health (NIH) in 2005 revealed the Roadmap Initiative to encourage, as they term, "new organizational models for team science." However, have the ideas of interdisciplinary science and large teams become inappropriately intertwined for today's research questions?

There is no doubt that science is getting more complex and specialized due to the sheer volume of knowledge produced annually. Nonetheless, the NIH-envisioned, "interdisciplinary research teams of the future" may not always be required to make scientific progress. I am not arguing against scientific collaboration—rather, the issue is a matter of emphasis between natural partnerships among individual scientists of synergistic backgrounds and the *de facto* assembly of interdisciplinary teams that reinforce old disciplines. By design, individuals within an interdisciplinary team often identify themselves as an expert in something other than the scientific problem in focus, and consequently abdicate the majority of scientific work because it is not within their field. In this light, interdisciplinary teams tend to inhibit the cross-pollination of ideas between fields despite being comprised of individuals from diverse disciplines. Scientific progress is driven by questions—questions that may demand new ways of thinking from your prior training. You want to go where a question takes you, not where your training left you.

When I reflect upon scientific fields that have emerged, I don't observe interdisciplinary teams combining skills to solve a problem—I observe interdisciplinary *people* collaborating to re-envision our understanding of science. Consider, for example, the rise of molecular biology and two famous forebearers of the field, Watson and Crick. We don't remember them today by their formal professions as an ornithologist and a physicist, respectively. The first set of molecular biologists, many of them ex-physicists, viewed themselves as a new generation of biologists. Francis Crick explained, "I was forced to call myself a molecular biologist because when inquiring clergymen asked me what I did, I got tired of explaining that I was a mixture of crystallographer, biophysicist, biochemist, and geneticist, an explanation which in any case they found too hard to grasp." Emerging disciplines organize around novel problems, creating a shared culture and new training regimens for the next generation of scientists. However, scientists must be willing to break the ties of their one-dimensional disciplines to forge new fields and scientific horizons.

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Thus, this paradoxical state of science begs the question: how does one prepare in their formal education and scientific training for tomorrow's rapidly changing scientific landscape? As a senior undergraduate student endeavoring to find my own scientific voice, I can attest that a pressing concern for most undergraduates is whether their education and pursuits outside the classroom will directly translate into a career.

The path to a purposeful and meaningful career in science, or any other field, rarely proves linear. In my opinion, to achieve "purpose" even in the narrowest domain, there are few substitutes for sustained exposure to multiple, alternative views of the world. I think it is essential throughout your undergraduate studies to stretch your horizons and explore diverse interests to not only develop intellectual nimbleness and flexibility, but also to discover your greater lively purpose. Because, ultimately, groundbreaking science occurs due to the tenacity, passion and unique idiosyncrasies of individual scientists, working collaboratively to advance our collective understanding of truth.

-Mohamad Ali Najia

Mohamad Ali Najia is the Editor-in-Chief of *The Tower* Undergraduate Research Journal